KEESLER AIR FORCE BASE
INSTALLATION RESTORATION PROGRAM
KEESLER AFB, MISSISSIPPI

Statement of Basis – Group 1 Sites: Landfill 1 and Associated Sites

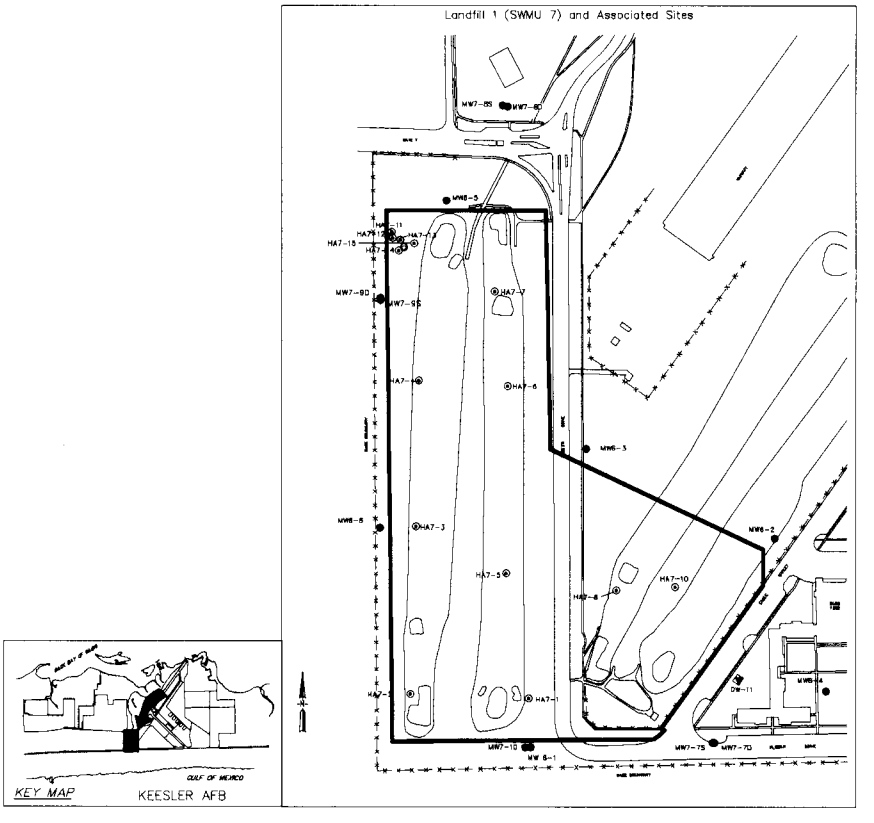
IRP SITE DESIGNATION

Landfill 1: IRP Site Code LF-04, RCRA Site Code SWMU 7.

TEL Sludge Disposal Site: IRP Site Code WP-13, RCRA Site Code SWMU 14.

Low Level Radioactive Waste Burial Vault: IRP Site Code RW-15, RCRA Site Code SWMU 15.

Landfill 1 and Associated Sites (SWMUs 7, 14, & 15)



INTRODUCTION

Keesler Air Force Base (Keesler AFB) is located within the city limits of Biloxi, Mississippi, on the peninsula bordered by the Back Bay of Biloxi and the Mississippi Sound. Landfill 1 (LF 1), consisting of solid waste management units (SWMUs) 7 (LF-04), 14 (WP-13), and 15 (RW-15), is located in the southwest corner of Keesler AFB and is approximately 20 acres in extent. The landfill was con-

structed using the trench and fill method without any liner or leachate collection system. Base refuse was placed in cells, covered with native soil, and the landfill area was subsequently planted with grass. The landfill was operated between 1950 and 1965. The majority of LF 1 is covered by the Base golf course. In addition to base refuse, unknown quantities of AVGAS sludge suspected of containing tetraethyl lead (TEL) were buried in the northern portion of the site (SWMU 14). Also reportedly buried in the northern portion of the landfill is a concrete vault containing low-level radioactive wastes (SWMU 15).

This document, called a Statement of Basis, is part of the cleanup planning process and is a requirement of the RCRA permit issued by the United States Environmental Protection Agency (USEPA). The proposed remedy, long term monitoring of groundwater and land use controls (LUCs) is explained along with any other possible remedies that have been evaluated. Public comment and participation in the remedy selection process is requested.

The information presented in this Statement of Basis summarizes the information obtained from previous investigations conducted at Landfill 1. Detailed information concerning these SWMUs can be found in the RCRA Facility Investigation (RFI)/Group 1 Sites Report (RFI Report, April 1999). This document will be available in the Administrative Record. The Administrative Record is located at the information repositories identified later in this Statement of Basis.

The public is encouraged to comment and participate in the remedy selection. The public is also encouraged to review the Administrative Record. The USEPA will select a final remedy for Landfill 1 and associated sites only after the public comment period has ended, and all comments are reviewed and considered.

PUBLIC COMMENT PERIOD AND PUBLIC MEETING

The public is encouraged to provide comments regarding the corrective action alternatives provided in the RFI Report (April 1999) and this Statement of Basis. In addition, the public may comment on any other corrective action alternatives, including those not previously evaluated. The public is also invited to provide comments on corrective action alternatives not presented in the above mentioned documents.

Important dates to remember

Public comment period begins:
January 13, 2000

Public comment period ends:
February 26, 2000

Please note, written comments must be postmarked no later than midnight **February 26, 2000.** A public meeting will be held, if requested. During the public meeting, USEPA, the Mississippi Department of Environmental Quality (MDEQ), and the U.S. Air Force will be available to respond to oral comments and questions.

The Administrative Record for Landfill 1 and associated sites is available at:

Biloxi Public Library
Reference Section
139 Lameuse Street
Biloxi, Mississippi
Mon., Tue., Wed., 9 A.M. to 8 P.M.
Thu., Fri., Sat., 9 A.M. to 5 P.M.

Comments received will be summarized and responses will be provided in the Responses to Comments document. The Responses to Comments document will be prepared following the close of the public comment period. The comments and the Responses to Comments will be included with the final permit modification in the Administrative Record.

To request further information please contact:

Ms. Lisa Noble
Keesler AFB, Mississippi
(228) 377-8255
lisa.noble@keesler.af.mil

or

Mr. Robert Pope
U.S. Environmental Protection Agency, Region IV
(404) 562-8506
pope.robert@epamail.epa.gov

or

Mr. Bob Merrill
Mississippi Department of Environmental Quality
(601) 961-5049
bob_merrill@deq.state.ms.us

Submit written comments to:

U.S. Environmental Protection Agency
Attention: Mr. Robert Pope
US. Environmental Protection Agency, Region 4
Federal Facilities Branch
61 Forsyth Street
Atlanta, GA 30303

Comments must be postmarked no later than midnight, **February 26, 2000.**

PROPOSED REMEDY

The USEPA is proposing long-term groundwater monitoring and LUCs including groundwater use restrictions and land use restrictions.

LANDFILL 1 AND ASSOCIATED SITES DESCRIPTION

LF 1, consisting of SWMU 7 (LF-04) and the associated SWMUs 14 (WP-13) and 15 (RW-15), is located in the southwest corner of Keesler AFB and is approximately 20 acres in extent. LF 1 is bounded on the north by West Gate Road; on the east by the Base golf course, the runway and student housing; on the south by the Base boundary and residential areas; and on the west by the Base boundary and a commercial area. Ploesti Drive runs north-south across the central portion of LF 1. The majority of LF 1 is covered by the Base golf course.

LF 1 was operated between 1950 and 1965 and was constructed using the trench and fill method without any liner or leachate collection system. Base refuse was placed in cells, covered with native soil, and the landfill area subsequently planted with grass. Based on a visual observation of the site topography at least 14 landfill cells appear to be oriented east-west, each measuring approximately 60 feet wide by 250 feet long.

In the 1950s or 1960s, unknown quantities of AVGAS sludge suspected of containing tetraethyl lead (TEL) were buried in the northern portion of LF 1. The suspected TEL burial area is designated as SWMU 14 (WP-13). Also, reportedly buried in the northern portion of the landfill is a concrete vault designated SWMU 15 (RW-15), containing low-level radioactive wastes. The radioactive wastes reportedly consist of iodine-125, cobalt-57, and radium instrument dials that were generated by the Medical Center and Airbase Navigational System. The vault was buried in the mid-1950's and is reportedly located 30 feet south of the TEL Sludge Disposal Site (SWMU 14). The vault is constructed of a 5-foot layer of concrete on the bottom of a well casing of unknown diameter. Wastes were placed in the casing periodically up until the 1960's. A 5-foot thick layer of concrete covers the top of the waste material. The vault is reportedly buried 12 feet below land surface (bls); it is not known whether this depth refers to the top of the vault or the base of the vault. Specific construction details of the vault are unknown and no design drawings are available.

Landfill 1 Investigations and History

An investigation was conducted in 1987 by Environmental Science and Engineering (ESE) at the LF 1 site. This investigation involved the installation and sampling of six monitoring wells within the surficial aquifer and a metal detector survey to locate the radioactive waste vault and TEL sludge drums. The groundwater analytical results showed the presence of metals, organic solvents and low levels of radioactivity. The metal detector survey confirmed the presence of metal objects throughout LF 1, but could not confirm the locations of the TEL Sludge Disposal Site (SWMU 14, WP-13) or the Low-Level Radioactive Burial Vault (SWMU 15, RW-15).

In 1992, an RFI was conducted at LF 1. During the RFI, field activities such as geophysical surveys, hand auger borings, monitoring well installation, and soil and groundwater water sampling were conducted to locate and delineate the extent of contamination at the LF 1 site, including SWMUs 7 (LF-04), 14 (WP-13), and 15 (RW-15).

SWMU 7 (LF-04) - Ten hand auger borings were installed across LF 1 (borings HA7-1 through HA7-10) to collect soil samples for analyses to evaluate the surface pathway for migration of hazardous constituents. Ten soil samples from the borings were analyzed for volatile organics, semivolatiles, pesticides/ PCBs, herbicides, and metals. The ten borings also provided data to determine the thickness of the landfill soil cover in place at the site.

A total of 13 groundwater monitoring wells were installed at SWMU 7. Six wells (MW6-1 through MW6-6) were installed by ESE and seven wells (MW7-7S,-8S,-9S, -1D, -7D, -8D, and -9D) were installed by Parsons ES. All 13 wells were sampled

during the RFI and analyzed for volatile organic compounds, semivolatiles, pesticides/ PCBs, herbicides, metals, and radioactivity.

A geophysical survey was also conducted across the northern portion of SWMU 7 (LF-04) in conjunction with attempts to characterize SWMUs 14 (WP-13) and 15 (RW-15). The survey indicated widely scattered metallic objects near the surface throughout the northern part of LF 1.

SWMU 14 (WP-13) - An additional five soil borings were hand augered in the suspected location of SWMU 14 (TEL Sludge Disposal Site, WP-13). Five soil samples were collected and analyzed for lead.

A geophysical survey was conducted in an attempt to locate the TEL Sludge Disposal Site (SWMU 14, WP-13), as well as to locate SWMU 15 (RW-15). Nonintrusive sampling techniques were used such as above ground detection of radiation, magnetic surveys, electromagnetic conductivity (EM) surveys, and ground penetrating radar (GPR).

The magnetic survey data indicated widely scattered ferrous materials throughout the northern portion of LF 1. These appear to be relatively shallow and may mask the responses of objects buried deeper in the ground. The EM surveys detected some buried water lines, but were inconclusive as to the possible location of SWMU 14 (WP-13). The GPR survey delineated what appeared to be a buried pit in the northwest corner of the site. This may have been an indication of the approximate location of SWMU 14 (WP-13), however, hand auger borings did not detect lead at elevated concentrations and visual analysis of the soils did not show any signs of a waste release.

SWMU 15 (RW-15) - The geophysical survey described above was conducted in part to attempt to locate the Low-Level Radioactive Waste Burial Vault (SWMU 15, RW-15) using nonintrusive sampling techniques. As mentioned above, the magnetic survey data indicated widely scattered ferrous materials, none of which seemed to be conclusively indicative of the presence of SWMU 15 (RW-15). The EM surveys were also inconclusive as to the location of SWMU 15 (RW-15). The GPR survey delineated features in the suspected vicinity of SWMU 14 (WP-13), but nothing in the suspected vicinity of SWMU 15 (RW-15). The radiation survey did not indicate any major anomalous areas.

In addition to the geophysical work, groundwater samples collected from wells at the LF 1 site were analyzed for radioactivity which may be related the presence of the Low-Level Radioactive Waste Burial Vault.

The existence of the Radioactive Waste Vault is based upon interviews conducted during the Phase 1 - Records Search. The location of this SWMU was investigated by geophysics, radiation survey, soil borings and groundwater sampling. These investigations indicate that SWMU 15 (RW-15) has not leaked, is not located in the area described by the Phase 1, or does not exist.

Landfill 1 Investigation Results

The following is a brief summary of the detected chemical concentrations for each environmental medium investigated at SWMUs 7 (LF-04), 14 (WP-13), and 15 (RW-15) during the RFI.

Soil

Ten auger borings were installed across LF 1 to determine the thickness of the landfill soil cover and to collect soil samples for analyses. Chemicals detected in the soil included semivolatile organics, pesticides, and metals. Characterization of the soil medium was based essentially on the analytical results for surface soil samples (0-2 feet below land surface). The horizontal extent of the soil contamination included the entire landfill surface and appeared to be randomly distributed, although the highest concentrations tended to occur in the southeast corner of the site.

An additional five soil borings were hand augered in the suspected location of SWMU 14 (WP-13) and the samples analyzed for lead. Lead concentrations were found to be below the maximum background concentration as shown in the following table.

Sample Location	Lead Concentration (mg/kg)	Maximum Background Lead Concentration (mg/kg)
HA7-11	6.28 J	28.3
HA7-12	2.17	
HA7-13	13.4	
HA7-14	5.01	
HA7-15	18.6	

A detailed description of the soil sample locations, chemicals and concentrations detected at the landfill site is presented in the RFI Report (Parsons ES, April 1999).

Groundwater

Based on measurements from December 1992 through September 1996, the horizontal groundwater flow direction of the surficial aquifer is to the southeast. The shallow groundwater table across the site varies from approximately 24 feet above mean sea level (MSL) to approximately 16 feet above MSL. Depth to the shallow groundwater varies from approximately 1.7 to 10.8 feet bls.

Based on results from the eight wells sampled for physical characteristics, the shallow groundwater at LF 1 has similar physical characteristics (e.g., pH, turbidity, conductivity, and total dissolved solids) to the groundwater at the background locations. The groundwater is not currently used as a water source. Groundwater samples were collected from the 13 monitoring wells within the surficial aquifer at LF 1. Chemicals detected in the groundwater consisted of volatile and semivolatile organics, pesticides, metals, and radionuclides. A detailed description of the analytical results for the groundwater samples from the LF 1 site is presented in the RFI Report (Parsons ES, April 1999).

Levels of radioactivity detected in the groundwater, mainly gross alpha and beta activities, may be related to naturally occurring nuclides or leakage from the storage vault. In general, peat layers that were penetrated by groundwater wells showed elevated gross alpha and beta activities; thus, the observed radioactivity may be from naturally occurring nuclides that sorb to the organic matter, rather than leakage from the buried vault. Strontium-90, which was detected in one groundwater sample (MW7-9D), is a man-made compound. However, no usage of strontium-90 or parent compounds has been reported at Keesler AFB. Monitoring well 7-9D (MW7-9D) was re-sampled by Keesler AFB on 12 October 1995. The levels of strontium-89 and strontium-90 were less than 0.60 picocuries\liter (pCi/1) and less than 1.6 pCi/1, respectively. The standard for a community water system is 8 pCi/1 for strontium-90.

The groundwater wells were resampled and analyzed for metals in September 1996. Sampling was performed using a slow purge peristaltic pump. The analytical results from the resampling effort showed that a major portion of the metals originally found in the groundwater were associated with the suspended solids and were not in a dissolved state in the groundwater.

Landfill Extent

An investigation of the landfill cover was conducted in April 1997 by Parsons ES at SWMU 7. This investigation involved hand augering to delineate the areal extent of SWMU 7 east of Ploesti Road, in the southeast portion of the landfill. Results indicated that the landfill did not appear to extend north beyond the limits of monitoring well MW6-2. In addition, hand augering results adjacent to student housing did not indicate the presence of landfill debris.

SUMMARY OF LANDFILL 1 RISKS

Soil and groundwater data from the RFI and Corrective Measures Study (CMS) were used to evaluate human health and ecological risks associated with exposure to contaminants in the affected media (RFI Report, April 1999 and CMS, March 1999).

For human health, USEPA Region 4 has established a target level below which derived cancer risks and non-cancer hazards are considered to be acceptable. Risks were evaluated for current maintenance workers, hypothetical future maintenance workers, hypothetical future construction workers, and hypothetical future residents (both adults and children) and compared to the USEPA Region 4 target levels.

Current industrial workers at LF 1 were assumed to be exposed only to soils located at the surface (surface soil). All future receptors were expected to be exposed to contaminants in both surface and deep (subsurface) soil. In the future, excavation activities are assumed to result in deep soils being uncovered and brought to the surface, resulting in the deep soils becoming available for contact by the future receptors. In addition, hypothetical future industrial workers and hypothetical future residents were expected to be exposed to groundwater.

Using USEPA Region 4 methodology, Chemicals of Concern (COCs) were identified for the hypothetical future maintenance workers and residents [total scenario cancer risk greater than or equal to 1 x 10-4 (one in 10,000) and total scenario hazard (noncancer effects) greater than or equal to 1.0]. Although COCs were identified for the hypothetical

future resident, it should be noted that, given the current and anticipated future use of the site as a golf course, it is highly unlikely that residential development will ever occur at LF1. Although the hypothetical future resident is not expected to live at the site, this group was included in the risk assessment to allow a health-protective evaluation of the soil and groundwater at LF 1. The total risks and hazards derived for all other receptors were below the USEPA target levels for cancer and non-cancer effects.

Human health COCs in soil and groundwater for future receptors at LF 1 were identified per USEPA Region 4 guidance. In surface soil, arsenic and dieldrin were identified as COCs at LF 1. These chemicals were found to result in a potential increase in non-cancer hazards and cancer risks in the future maintenance workers (arsenic only) and residential receptors. Lead was the only constituent evaluated in subsurface soil samples. The maximum detected concentration of lead in subsurface soil (2-6 feet) was below the USEPA Region IV Action Level (400 mg/kg), and therefore, COPCs were not identified in subsurface soil at LF 1.

In groundwater, arsenic, radium-226 and strontium-90 were identified as COCs for both the future maintenance worker and future residents. In addition, alpha-BHC, and bis(2-ethylhexyl)phthalate were identified as COCs for the hypothetical future residents. Bis(2-ethylhexyl)phthalate and strontium-90 were also identified as COCs from the ARAR comparison.

Medium	COC (1)	Maximum Detected (2)	Federal MCL (3)	MS MCL(4)	Exposure Routes (5)	Cancer Risk (6)	HQ (non-cancer) (7)
Groundwater	Arsenic	1.9×10^{-2}	5×10^{-2}	5×10^{-2}	Ingestion/ Dermal	1×10^{-4}	0.6
	Bis(2-ethylhexyl) phthalate	1.2×10^{-2}	6×10^{-3}	6×10^{-3}	Exceeds ARAR	8×10^{-7}	0.008
	Alpha-BHC	3×10^{-5}	NR	NR	Ingestion	2×10^{-6}	NA
	Radium-226	3.6×10^{0}	5×10^{0}	NR	Ingestion/ Dermal	7×10^{-6}	NA
	Strontium-90	9.3×10^{0}	8×10^{0}	NR	Ingestion/ Dermal	3×10^{-6}	NA
Surface Soil	Arsenic	$1.4 \times 10^{+1}$	NR	NR	Ingestion/ Dermal/ Inhalation	4×10^{-6}	0.02

(1) Chemical of Concern
(2) Maximum Detected Value. Units in mg/L (water) or mg/kg (soil).
(3) Maximum Contaminant Level, EPA 1996. Units in mg/L.
(4) Maximum Contaminant Level, MSDEQ 1991. Units in mg/L.
(5) Pathways of exposure resulting in a chemical being identified as a COC.
(6) Total risk = ingestion + dermal risk, where appropriate.
(7) Total Hazard Quotient = ingestion + dermal HQ, where appropriate.
(8) Standard for strontium-90 in community water systems (40 CFR 141.15).
NR Not Reported - No ARAR for this analyte.

The COCs identified from the human health risk assessment for future maintenance workers and future residents are presented in the following table along with their associated cancer and noncancer risk. The future maintenance worker is the most probable future on-site receptor at LF 1.

The majority of the risk derived for the receptors was associated with groundwater contact (drinking and bathing in water obtained from a hypothetical well drawing water from the surficial aquifer located on the site). It should be noted that Keesler AFB currently obtains drinking water from deep aquifer wells and it is not likely that any future group will obtain drinking water from a shallow well drilled onsite. Exposure to shallow groundwater beneath the site, therefore, is considered to be highly unlikely for any future receptor group.

The maximum detected concentrations (MDC's) of the COCs identified from the risk assessment and the ARAR comparison and recommended cleanup value are presented below for groundwater.

COC	MDC Groundwater (mg/L)	Recommended Cleanup Level (mg/L) (1)
Arsenic (mg/L)	0.0185	0.05
Alpha - BHC (mg/L)	0.00003	NR
Radium - 226 (pCi/l)	3.6	5.0
Bis(2-ethylhexyl) phthalate (mg/L)	0.012	0.006
Strontium-90 (pCi/l)	9.3	8.0

(1) - The recommended cleanup values are defined as the cleanup levels associated with the Federal Drinking Water Regulations and Mississippi Groundwater Quality Standards.

(NR) - No MCL for this analyte.

In groundwater, the maximum detected concentrations (MDC) for bis(2-ethylhexyl)phthalate and strontium-90 exceeded the cleanup criteria.

An ecological characterization was performed to evaluate pathways for exposure of wildlife and vegetation to site contaminants (RCRA Facility Investigation (RFI)/Group 1 Sites report, April 1999). The conceptual model indicated that due to the highly developed nature of the site, the use and value of these areas as terrestrial habitat is minimal. Therefore, no further ecological evaluation be conducted at LF 1.

CORRECTIVE ACTION SCOPE

The Corrective Action proposed in this Statement of Basis is intended to be the only corrective action taken at LF 1. The corrective action includes long-term groundwater monitoring and land use controls such as maintaining a 1.5 - 2 feet thick soil cover over the solid waste and the prohibition of construction activities on site. This action poses no threat to human health or the environment based on current site conditions at LF 1. Annual reporting of the groundwater sampling results and site status are required as part of the remedy.

CURRENT ACTIVITIES AT LANDFILL 1

The RFI and the CMS have been completed for Landfill 1. The proposed corrective actions are explained in this document. Once the actions are approved, they will be implemented.

CORRECTIVE ACTION ALTERNATIVES SUMMARY

On the basis of protecting human health and the environment from hazardous constituent releases and prevent such releases in the future, long-term monitoring with institutional controls was found to be the best-suited alternative for the LF 1 site.

The RFI and Corrective Measures Study (CMS) for LF 1 and associated sites identified groundwater and surface soil as media of concern for hypothetical future maintenance workers and residential receptors (adult and child residents). Therefore, the selected remedial alternative for this site should consist of long-term groundwater monitoring and land use controls (land use restrictions and groundwater usage restrictions). Monitoring of groundwater would provide a reliable confirmation of detrimental changes in groundwater concentrations. Based on the ARAR comparison, monitoring wells surrounding LF 1 would be sampled annually for the following COCs: arsenic, alpha BHC, bis(2-ethylhexyl)phthalate,

radium-226 and strontium-90. Annual monitoring of the soil surface at LF 1 would be conducted to assure that land use has not changed and that landfill materials remain covered by the existing soil cover. The thickness of the existing cover will be evaluated annually by performing several shallow soil borings with a hand auger at various places of the cover. If the cover is found to be deteriorating or is nonexistent in an area during the monitoring period, corrective measures would be initiated. The groundwater and land use restrictions would prevent future development of the site and also prevent the usage of site groundwater by potential human receptors. This corrective action alternative is the only alternative considered for LF 1 because of the individual Corrective Measures Study completed for this site in March 1999.